Method for video object monitoring with a mobile communication system

[0001] The invention relates to the method for video object monitoring with a mobile communication system according to the preamble of claim 1.

[0002] Different technologies are used for different monitoring tasks. All technologies have in common that the signals, for example image and sound data, are initially recorded in a transmitting unit with a microphone, camera, sensors etc. and then transmitted to a remote receiving station. These receiving stations can be implemented, for example, as control monitors in security centers, baby phone receivers, etc.

[0003] The technologies used for transmitting the data can be classified initially as technologies for local operation and as technologies for long-distance operation.

[0004] For local operation, mostly covering distances between transmitter and receiver of less than 300m, the data are transmitted via a direct cable connection or by radio transmission. Systems used for radio transmission typically establish a direct wireless connection between transmitter and receiver. Disadvantageously, however, the receiving station has to be located in close proximity to the monitored object or area. EP 1 124 355 A2 describes an exemplary video monitoring system. The video data are here recorded by a camera and transmitted via a cordless telephone system. The video image can be viewed on the display of the cordless telephone.

[0005] For long-distance operation, a dial-up connection is set up, as needed, between the transmitter and receiver via a public communication network. The dial-up connection can be set up following a triggering event (trigger), and can be triggered, for example, by motion sensors or also in regularly scheduled time intervals. It is also known to transmit video image from so-called Webcams via the Internet. Such long-distance transmission of video signals via an ISDN network or a mobile radio-communication network C is known from DE 41 26 105 A1.

[0006] However, all transmission methods must ensure that only an authorized receiver can receive the video data from the transmitter. This can be accomplished with a dial-up connection, for example, by inquiring a username in combination with a password, and in the Internet by using known encryption methods (e.g., certificates).
[0007] Both the transmitter and the receiver must ensure that the transmission is secure, which may be difficult to implement for technically inexperienced users.

[0008] It is the object of the invention to provide a method for the video object monitoring with a mobile communication system, wherein a user without technical know-how can readily set up a secure video transmission via the Mobil communication system

[0009] This object is solved with the invention by the features of claim 1.

[00010] According to the invention, a device of the mobile communication system checks before or while the connection is set up, if the receiver is authorized to receive video data from the transmitter.

[00011] Advantageous embodiments and modifications of the invention are recited in the dependent claims.

[00012] The invention has the following advantages over the state of the art:

- The method provides excellent mobility by using mobile monitoring terminals.
- No landline connection, for example via a fixed public network, is necessary.
- Video data can be easily transmitted over long distances, being limited only by the transmission range of the mobile communication system.
- An existing mobile radio-communication infrastructure, for example GSM/UMTS, can be used for transmitting the video data.
- The established dedicated identification process of the mobile communication system, for example provided by a SIM card, can be used for identifying the transmitter and receiver to the communication network or for mutual identification of transmitter and receiver.
- The transmitter and receiver can be personalized according to government regulations (e.g. G10 in Germany).

[00013] It is an object of the invention to offer the user a completely pre-configured transmission method and a corresponding pair of suitable devices. The device pair consists of a transmitter and a receiver. The transmitter includes a video camera, a microphone, optionally additional sensors, for example motion detectors, and a GSM/UMTS wireless device. All these devices all preferably integrated in a compact unit, but can also be implemented as separate units interconnected with connecting cables or via a wireless interface, for example infrared or Bluetooth. The receiver is a GSM/UMTS terminal capable of reproducing moving images and audio signals. To selectively receive and control more than one transmitter, the terminal on the receiver side can include a kind of "browser", for example based on the WAP or (X)HTM technology, that can be used to select the transmitter to be received. A connection between the transmitter and the receiver can advantageously be set up by dialing the mobile subscriber telephone number (MSISDN) assigned to the selected transmitter.

Both the transmitter and the receiver can therefore set up a connection.

[00014] A connection can also be set up by dialing a temporary IP address assigned to the transmitter and the receiver.

[00015] According to the invention, both the transmitter and the receiver can be equipped with a video camera, so that the transmitter can optionally be used as a receiver, and the receiver can optionally be used as a transmitter.

[00016] The method can be used in many ways. For example, it can be used as a type of baby phone with video control. It can also be used for monitoring remote areas, for example for detecting a burglary at a primary residence, a vacation home, manufacturing and industrial buildings, etc. It can also be used for monitoring construction sites or traffic. It would also be feasible to monitor hospital patients with a mobile device. A mobile Webcam could also be implemented.

[00017] Advantageously, all these applications allow only an authorized receiver to receive video data from the transmitter.

[00018] An exemplary embodiment of the invention will now be described with reference to the drawing.

[00019] On the transmitter side, the system includes a video camera 1 that is connected to a GSM/UMTS mobile communication terminal 2. Ideally, the video camera 1 can include a GSM/UMTS module, or a GSM/UMTS terminal 2 can be equipped with a video camera 1. If the video camera 1 and the GSM/UMTS terminal 2 are implemented as separate units, then a wireless data link can be established between the video camera 1 and the GSM/UMTS terminal 2, for example via Bluetooth.

[00020] The unit of video camera 1 and GSM/UMTS terminal 2 is capable of encoding the video signal captured by the video camera 1 for transmission over the mobile communication network 3 using the standard GSM/UMTS transmission channels, such

as GPRS, HSCSD, UMTS Video Bearer.

[00021] On the receiver side, at least one GSM/UMTS terminal 4 is provided that is capable of processing the video and audio information transmitted by the transmitter and display or reproduce the information on a display of the terminal 4.

[00022] In addition, a subscriber identification module 5 and 6, for example in the form of a SIM card, is required for each transmitter unit 2 and for each receiver unit 4. The SIM cards 5 and 6 of the corresponding transmitter or transmitters 2 and of the receiver 4 are assigned a common subscriber association by a network operator 11 of the mobile communication network 3. For this purpose, the mobile communication network includes a database 7, where subscriber data 8 and 9, for example IMSI and/or MSISDN, of the transmitter 2 and the receiver 4 are stored and associated with each other. When the subscriber attempts to use the receiver 4 to set up a connection to a transmitter 2, a control device 10 of the network operator 11 checks first if the receiver 4 is authorized to receive video data from the transmitter 2. This ensures that only transmissions between defined subscriber associations are allowed. Transmissions to other receivers are only possible, if the transmitting unit 2 explicitly authorizes the receivers (outside the subscriber association). This authorization is stored with the operator 11 of the mobile communication system.

[00023] Because the GSM/UMTS networks have very limited resources and in most cases data need not be transmitted continually, transmission preferably occurs only when initiated by a trigger, i.e., a triggering event. Triggering can be initiated either from the transmitter 2 or from the receiver 4.

[00024] Triggers can be set off:

- at periodic time intervals
- if requested directly by the transmitter or the receiver
- by external signals and parameters captured by the transmitter or receiver, for example when threshold values are exceeded, based on a measured audio

volume, based on a detected motion, based on brightness, etc.

[00025] If the transmitter 2 is powered by a battery, for example a rechargeable battery, then measures should be taken to conserve power. For example, only video data that are to be transmitted may be processed. The transmitter 2 can also be operated in standby mode, which can be canceled by a trigger signal, whereby the device is then switched to an active mode.

[00026] The employed terminals 2 and 4 can be used in different modes, for example in a monitoring mode which can include video monitoring, or in a "normal" mobile radio-communication mode, i.e., without security interrogation regarding receive authorization of the receiver.

[00027] Before being able to use the method, the user (subscriber) must purchase a transmitting unit that includes of video camera 1 and GSM/UMTS terminal 2 and/or a receiver unit that includes a GSM/UMTS terminal 4 with a video display. The subscriber must also purchase corresponding SIM cards 5, 6 for the transmitter 2 and the receiver 4, respectively. The operator 11 of the mobile communication system 3 enters the IMSI/MSISDN numbers of the transmitter 2 and the receiver 4 associated with the subscriber association into a database 7, thereby linking the two subscriber associations 8, 9.

[00028] The operator 11 of the mobile communication system can also enter specific routing rules for IP addresses from particular address ranges into corresponding router/firewalls of the mobile communication system. The routing rules can specify, for example, that only one additional defined IP address obtains access to a particular IP address from the address range.

[00029] For example, a connection can be set up as follows:

[00030] The transmitter 2 and the receiver 4 subscribe to the GSM/UMTS communication network 3, which requires the subscriber data stored on the SIM cards 5, 6. The subscriber data, for example the IMSI/MSISDN, are stored in the database 7.

A dynamic public IP address from a specific address range stored in the database 7 is assigned to the transmitter 2. Likewise, a dynamic public IP address is assigned to the receiver 4. The receiver 4 can now search for and/or select a particular transmitter 2 based on the data in the database 7. Based on the information in the database 7, the control device 10 then checks if the receiver 4 is authorized to receive the selected transmitter 2. If the receiver 4 is authorized to receive the transmitter 2, then the receiver 4 can directly contact the transmitter, for example by setting up a connection to the temporary IP address or by dialing the telephone number of the transmitter 2 of the mobile subscriber. When the desired connection to the transmitter 2 is established, the transmitter 2 transmits the desired video and audio information to the receiver 4 via the mobile communication system 3.

[00031] List of a reference numerals

1	video camera
2	mobile communication terminal (transmitter)
3	mobile communication network
4	mobile communication terminal (receiver)
5	SIM
6	SIM
7	database
8	subscriber data
9	subscriber data
10	control device
11	operator